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(21) International Application Number: PCT/EP92/01416 (22) International Filing Date: 17 June 1992 (17.06.92) (30) Priority data: 9113796.8 26 June 1991 (26.06.91) GB (71) Applicant (for all designated States except US): SCHERING AKTIENGESELLSCHAFT [DE/DE]; Müllerstr. 170-178, D-1000 Berlin 65 (DE). (72) Inventor; and (75) Inventor/Applicant (for US only) : JOPPIEN, Hartmut [DE/ DE]; Müllerstr. 170-178, D-1000 Berlin 65 (DE). (74) Agent: WALDMAN, Ralph, David; Schering Agrochemi- cals Limited, Industrial Property Department, Chester- ford Park Research Station, Saffron Walden, Essex CB10 1XL (GB).		(81) Designated States: AU, BR, JP, RU, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: PESTICIDAL COMPOSITIONS COMPRISING AMITRAZ AND IMIDACLOPRID (57) Abstract Pesticidal compositions comprising amitraz and imidacloprid.		

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PESTICIDAL COMPOSITIONS COMPRISING AMITRAZ AND IMIDACLOPRID

5 Field of the invention

This invention relates to pesticidal compositions containing amitraz.

10 The present invention provides a pesticidal composition comprising

- a) amitraz and
- b) imidacloprid.

Amitraz is a known insecticide and acaricide and is the
15 common name for N,N-bis(2,4-xylyliminomethyl)methylamine.
Imidacloprid is a known insecticide and is the common name
for 1-(6-chloro-3-pyridylmethyl)-N-nitroimidazolidin-
2-ylideneamine.

20 We have found that the compositions of the invention have
advantageous properties over the individual components and
that synergism is often demonstrated.

The ratios of the amitraz to imidacloprid vary over a wide
25 range but are usually in the range 10:1 to 1:10,
especially 5:1 to 1:5.

In addition, other pesticides may be employed in
conjunction with the active ingredients described above
30 providing they do not adversely affect the interaction
between the components a) and b). For example it is
sometimes useful to include additional insecticides or
acaricides to extend the range of activity in order to
control a wider spectrum of pests.

The compositions of the invention are active against a wide range of pests, e.g. Lepidoptera, including Spodoptera spp, eg S.littoralis, Heliothis spp., eg H. armigera and H. viriscens, and Pieris brassicae;
5 Diptera, including Musca domestica, Ceratitis capitata, Erioischia brassicae, Lucilia sericata and Aedes aegypti;
Homoptera, including aphids such as Megoura viciae and Nilaparvata lugens; Coleoptera, including Phaedon cochleariae, Anthonomus grandis and corn rootworms
10 (Diabrotica spp. eg. Diabrotica undecimpunctata);
Orthoptera, including cockroaches, such as Blattella germanica; Hemiptera, such as Nilaparvata lugens,
Nephotettix cincticeps, aphids, and Psylla spp.; ticks,
e.g. Boophilus microplus; lice, including Damalinia bovis
15 and Linognathus vituli; as well as spider mites such as Tetranychus urticae and Panonychus ulmi.

The compositions of the invention may be employed in many forms and are often most conveniently prepared in aqueous
20 form immediately prior to use. One method of preparing such a composition is referred to as "tank mixing" in which the ingredients in their commercially available form are mixed together by the user in a quantity of water.
In addition to tank mixing immediately prior to use the
25 compositions containing amitraz and imidacloprid may be formulated into a more concentrated primary composition which is diluted with water or other diluent before use.
Such compositions may comprise a surface active agent in addition to the active ingredients and examples of such
30 compositions are as follows.

It can be a dispersible solution which comprises the active ingredients dissolved in a water-miscible solvent with the addition of a dispersing agent. Alternatively it
35 can comprise the ingredients in the form of a finely

ground powder in association with a dispersing agent and intimately mixed with water to give a paste or cream which can if desired be added to an emulsion of oil in water to give a dispersion of active ingredients in an aqueous oil emulsion.

An emulsifiable concentrate comprises the active ingredient dissolved in a water-immiscible solvent which is formed into an emulsion with water in the presence of an emulsifying agent.

A granular solid comprises the active ingredients associated with powder diluents such as kaolin, which mixture is granulated by known methods. Alternatively it comprises the active ingredients adsorbed or absorbed on a pre-granular diluent, for example Fuller's earth, attapulgite or limestone grit.

A dispersible or wettable powder usually comprises the active ingredients in admixture with a suitable surfactant and an inert powder diluent such as china clay.

Another suitable concentrate is a flowable suspension concentrate which is formed by grinding the active ingredients with water, a wetting agent and a suspending agent.

In some circumstances it may be desirable to combine two types of formulation e.g. one of the components is present in an emulsifiable concentrate and the second components is dispersed as a powder in this concentrate.

The concentrate of the active ingredients (when used as the sole active components) in a composition for direct application to the crop by conventional ground methods is

preferably within the range of 0.001 to 10 per cent by weight of the composition, especially 0.005 to 5 per cent by weight, but more concentrated compositions containing up to 40 per cent may be desirable in the case of aerial sprays.

The invention thus includes a method for controlling a pest, especially an insect pest, which comprises applying to the pest or its locus, amitraz and imidacloprid either together or in sequence.

The invention is illustrated in the following Examples which describe experiments in which a synergistic effect was observed. The desired concentration of the active ingredients was achieved by diluting, with water, a 20% emulsifiable concentrate of amitraz and an acetone solution of imidacloprid, each of which contained conventional surfactants.

20 Example 1

Activity against larvae (L1) of the cotton bollworm (Heliothis virescens)

25 0.2 ml Portions of the active ingredients, at the rates shown, were pipetted onto samples of artificial feed material. After drying, the feed material was put into polystyrene petri dishes. After an hour, 10 L1 of the cotton bollworm (Heliothis virescens) were counted into
30 the dishes. The closed dishes were left for two days at 26-7°C in a controlled environment room, under extended daylight conditions. The % mortality of the larvae in comparison with untreated controls was assessed. The results are shown in Table 1.

5

Table 1

	Concentration of amitraz (ppm)	Concentration of imidacloprid (ppm)	% Control
5	400	0	0
	160	0	0
	64	0	0
10	0	400	90
	0	160	60
	0	64	60
	0	25	0
15	160	160	100
	64	160	85

Thus although the amitraz shows no activity, even at the
 20 highest rate, it synergistically increases the activity of
 imidacloprid.

Example 2

Ovicidal activity against eggs of the cotton bollworm
 25 (Heliothis virescens)

0.2 ml Portions of the active ingredients, at the rates
 shown, were pipetted onto one and two day old eggs that
 had been laid on filter paper by the cotton bollworm
 30 (Heliothis virescens) female moths, in polystyrene petri
 dishes. The closed dishes were left for three days at 26-
 7°C in a controlled environment room, under extended
 daylight conditions. The % inhibition of hatching of the
 eggs in comparison with untreated ggs indicates the level
 35 of activity.

The results are shown in Table 2.

<u>Table 2</u>		% Control	
5	Concentration of amitraz (ppm)	Concentration of imidacloprid (ppm)	
			One day old eggs Two day old eggs
10	25	0	50 50
	10	0	50 50
	0	25	50 50
	0	10	0 0
	0	4	0 0
15	10	10	90 95
	10	4	95 95

Thus although the imidacloprid shows no activity, alone,
 20 at the two lower rates, it synergistically increase the
 activity of amitraz. The mixtures also have a greater
 activity than the top rates of the individual active
 ingredient even though the combined active ingredient
 content is lower than the top rates of the individual
 25 active ingredients.

Claims

- 1) A pesticidal composition comprising
 - a) amitraz, and
 - 5 b) imidacloprid.
- 2) A composition according to claim 1 wherein the ratio of the amitraz to imidacloprid is in the range 10:1 to 1:10.
- 10 3) A method for controlling a pest, especially an insect pest, which comprises applying to the pest or its locus, amitraz and imidacloprid, either together or in sequence.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 92/01416

I. CLASSIFICATION F SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 A01N43/50		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	A01N	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claims No. ¹³
A	EP,A,0 387 663 (BAYER) 19 September 1990 ---	
A	GB,A,1 577 357 (THE BOOTS COMPANY LTD) 22 October 1980 ---	
A	JOURNAL OF ECONOMY ENTOMOLOGY vol. 80, no. 2, 1987, COLLEGE PARK, MD, USA pages 333 - 337 A.R.HOROWITZ ET AL. 'synergistic activity of binary mixtures of insecticides on tobacco budworm eggs' -----	
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
25 SEPTEMBER 1992		11. 11. 92
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. EP 9201416
SA 61454**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-0387663	19-09-90	DE-A-	3908814	20-09-90
		DE-A-	4000972	18-07-91
		AU-A-	5141890	20-09-90
		CN-A-	1045505	26-09-90
		JP-A-	2273601	08-11-90
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GB-A-1577357	22-10-80	SU-A-	1123531	07-11-84
		US-A-	4166130	28-08-79
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